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UNITED STATES NAVY

Medical News Letter

Vol. 45 Friday, 26 March 1965 No. 6

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MEDICAL NEWS LETTER

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Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014, giving full name, rank, corps, and old and new addresses.

FRONT COVER: Aerial view of U.S. Naval Hospital, Beaufort, South Carolina. This hospital, commissioned on 29 April 1949, is one of the Navy's most modern. The architecture and overall facilities of the hospital have been duplicated almost exactly in Peru for that country's Naval Medical Center. Three Peruvian Naval doctors spent some time at USNH, Beaufort several years ago and later served as advisers in construction of the new Peruvian hospital.

Since the pre-Korean opening date there have been 61,031 admissions, including wounded returned from the Far East. The bed capacity for emergency admissions is 372, for normal operations 318, with 200 officially authorized beds. The population served averages about 23,956, represented by 6,383 military personnel stationed at Parris Island Recruit Depot, 6,000 military recruits, 10,323 dependents, and 750 retired personnel. (Commanding Officer: Capt C. S. Hascall, Jr., MC USN)

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

SURGEON GENERAL'S MESSAGE TO ALL HANDS

REAR ADMIRAL R. B. BROWN, UPON HIS SUCCESSION TO THE OFFICE OF SURGEON GENERAL, SENT THE FOLLOWING LETTER TO ALL FLEET AND FORCE MEDICAL OFFICERS AND TO ALL MEDICAL ACTIVITIES UNDER THE MILITARY COMMAND OF THE CHIEF, BUREAU OF MEDICINE AND SURGERY. THIS LETTER IMPARTS A MESSAGE TO ALL PERSONNEL OF THE NAVY MEDICAL DEPARTMENT WHEREVER ASSIGNED. THEREFORE, IN ACCORDANCE WITH THE WISHES OF OUR NEW SURGEON GENERAL, THIS LETTER HAS BEEN INCLUDED IN THIS ISSUE OF THE U.S. NAVY MEDICAL NEWS LETTER:

"It has been my privilege to participate in and, perhaps, in some measure, contribute to the accomplishments of the Navy Medical Department under the capable leadership of Admiral Kenney and other illustrious predecessors. I recognize the demands and responsibilities of the Office of Surgeon General. I accept this challenge with the obligation to earn and justify the confidence and support of those in positions of higher authority as well as the loyalty and cooperation of the dedicated and capable men and women who make up our Medical Department.

I have always looked askance at the "new broom" type, the individual whose first acts in a job are to radically change things. Change for change sake is not in my plans. All programs now in effect will be continued but with expectation of modifying and improving them as indications arise and justifications are developed. Our efforts to find better solutions to the problems of personnel, facilities, and funds, which are ever with us, will not be relaxed. As new policies or programs are being considered I plan to keep you fully apprised of them.

This brings me to my first objective, that of improving communications between this Bureau and activities in the field. You are invited to submit problems which defy local solution and we, in turn, plan to visit you to obtain first hand information regarding your needs. The knowledge that your difficulties are fully understood and that corrective measures are being studied at this and higher levels should at least lessen frustration and encourage acceptability while solutions are being sought. This applies particularly to the frequent complaints and misunderstandings which arise over the equitable distribution of resources among our primary obligations to the operational forces, our often overwhelming commitments to patient care in all categories, and to training and research which are essential to competency and progress in our Medical Department.

I am certain that I speak for everyone in the Medical Department, and for all of those whom it has been our privilege to serve, when I thank Admiral Kenney for his strong leadership of the past four years and for the warmth and understanding which have been reflected in his every action. I thank him personally, in addition, for the heritage that is mine, our splendid Medical Department, and ask that each of you join me in a dedication to carry Navy medicine to ever greater heights."

R. B. BROWN

SPECIAL ARTICLES

RADM BROWN ASSUMED DUTY AS CHIEF OF BUMED

On 15 February, 1965 Rear Admiral Robert B. Brown MC USN, became Surgeon General and Chief of the Bureau of Medicine and Surgery. He had served since 1 August 1963 as Assistant Chief of BUMED for Personnel and Professional Operations and from 1 July 1964 as Deputy Surgeon General and Assistant Chief of the Bureau of Medicine and Surgery.

Admiral Brown brings to his new assignment an illustrious record of achievements in behalf of the advancement of professional and administrative matters within and outside the Medical Department of the Navy. Prior to his Bureau service some of his important duties were:

Commanding Officer, National Naval Medical Center, Bethesda, Md.

Commanding Officer, U.S. Naval Hospital, NNMC, Bethesda, Md.

Clinical (Adjunct) Professor of Surgery, Georgetown University School of Medicine.

Chief of Surgical Service and Chief of Professional Services, USS REPOSE (1950-1951)—for which Admiral Brown was awarded the Bronze Star Medal. The citation states in part: "For meritorious service as Chief of Professional Services and as Chief of Surgical Service in the Naval Hospital on board the USS REPOSE, in connection with operations against enemy aggressor forces in Korea from September 20, 1950 to July 12, 1951. Throughout this period, CAPT Brown rendered outstanding services to his patients and directly supervised the surgical treatment of all casualties admitted to his section. Exercising exceptional professional skill and a thorough understanding of the scope and importance of his assignment, he was largely responsible for the excellent care given to the more than 8000 patients admitted to the hospital and was greatly instrumental in saving the lives of many of the stricken men."

Chief of Surgery, USS TRANQUILLITY, 1945

Chief of Surgery, U.S. Naval Hospital, Annapolis, Md., 1943

Duty aboard the USS SOLACE, 1943

Having obtained the B.S. degree from Allegheny College, Meadville, Pennsylvania (1925-1929) and his Doctor of Medicine degree from the University of Pennsylvania (1929-1933), Doctor Brown received comprehensive graduate training at the University of Pennsylvania in General Surgery, and one year in Thyroid and Neurosurgery. During the period 1935-1941 he also served variously as Assistant Instructor in Surgery at the Medical School there, Instructor in Surgery, and Assistant in Surgery at the University of

Pennsylvania, Philadelphia General, Presbyterian and Doctors' Hospitals. In 1941 he received his Doctor of Science (in Surgery) degree from the University of Pennsylvania Graduate School of Medicine. During the period 1933-1935 he interned at the Hospital of the University of Pennsylvania.

In addition to the Bronze Star Medal, Rear Admiral Brown has the following service medals: Asiatic-Pacific Campaign Medal with one star; American Campaign Medal; World War II Victory Medal; National Defense Service Medal; Korean Service Medal; United Nations Service Medal; Expert Rifleman Medal and the Expert Pistol Shot Medal. He also has the Korean Presidential Unit Citation.

Dr. Brown is a Fellow of the American College of Surgeons and a Diplomate of the American Board of Surgery. He is a member of the Philadelphia County, the Pennsylvania State and American Medical Associations; the Society of University Surgeons; the American Surgical Association; the International Surgical Society; the Eastern Surgical Association; the Society of Vascular Surgery; the Southern Surgical Association; the American Association for the Surgery of Trauma; and Associate Member, Clinico-Pathological Society, Washington, D.C. and Philadelphia Academy of Surgery. In 1962 he received an honorary Doctor of Science degree from Allegheny College, Meadville, Pennsylvania.

His official home address is 704 Chestnut Street, Meadville, Pennsylvania. He is married to the former Jane Richardson of Pitman, New Jersey, and has a daughter, Mrs. Joan Brown Cox of Indiana.

REAR ADMIRAL CANADA, DEPUTY AND ASSISTANT CHIEF OF BUMED

Robert Owen Canada, Jr., was born in Grottoes, Virginia, on 16 July 1913, son of Mrs. R. O. (Mary Crawford) Canada and the late Dr. Canada. He attended Augusta Military Academy, Fort Defiance, Virginia, and received the degrees of Bachelor of Science from the University of Virginia, Charlottesville, and Doctor of Medicine from that University's School of Medicine. He was commissioned Lieutenant (junior grade) in the Medical Corps of the U.S. Navy on 16 July 1938, after completing his internship, and was subsequently advanced in rank to that of Rear Admiral, to date from 1 July 1964.

Ordered first to the U.S. Naval Hospital, Portsmouth, Virginia, he served as Ward Medical Officer there from August 1938 to April 1940, then reported to the USS SALINAS (AO-19) for duty as Medical Officer. He was serving in that capacity when the SALINAS was torpedoed off Iceland by a German submarine on October 30, 1941, prior to the outbreak of World War II. Detached in December 1941, he served until March 1944, as Officer in Charge of the Naval Unit at Fitzsimons General Hospital, Denver, Colorado.

During the latter period of the war, he was again at sea serving as Senior Medical Officer of the USS PASADENA (CL–65) from her commissioning in June 1944, until November 1945. The PASADENA operated in the Pacific combat area from September 1944 until August 15, 1945, participating in the capture and occupation of the Southern Palau Islands in September and October 1944; with the THIRD Fleet in the Leyte operation (including Luzon attacks) and the Luzon operation (including attacks on Luzon, Formosa, the China Coast and Nansei Shoto); with the FIFTH Fleet in the assault and occupation of Iwo Jima, made on Nansei Shoto and the Okinawa operation (including the assault and occupation of Okinawa Gunto); and THIRD

Fleet operations against Japan. She was in the Tokyo Bay Area during the Japanese surrender and subsequent occupation of Japan.

Returning to the United States, he reported in December 1945, to the Naval Hospital, Sampson, New York, where he served as Assistant Chief of Medicine until March 1947. He then had graduate instruction at Cornell Medical School, New York, New York, and in October of that year was detached for duty at the Navy Department, Washington, D.C. There he served as Head of the Tuberculosis Control Section, Bureau of Medicine and Surgery, until August 1950, when he was transferred to the Naval Hospital, National Naval Medical Center, Bethesda, Maryland, as Assistant Chief of Medicine and Head of the Chest Disease Section. In June 1952, he reported as Chief of Medicine at the Naval Hospital, Charleston, South Carolina.

In June 1955 he was detached from Charleston for similar duty at the Naval Hospital, Oakland, California, and in February 1959 reported as Chief of Medicine at the Naval Hospital, National Naval Medical Center, Bethesda, Maryland. In June 1961 he became Commanding Officer of the Naval Hospital at the Naval Air Station, Jacksonville, Florida, and in February 1962 returned to the Naval Hospital, National Naval Medical Center, Bethesda, Maryland. He commanded that Naval Hospital for two years and in February 1965 was designated Deputy and Assistant Chief of the Bureau of Medicine and Surgery, Navy Department, Washington, D.C.

RADM Canada has the American Defense Service Medal with bronze "A"; the American Campaign Medal; Asiatic-Pacific Campaign Medal with one silver star and one bronze star (six operations); the World War II Victory Medal; Navy Occupation Service Medal, Asia Clasp; National Defense Service Medal; and the Philippine Liberation Ribbon with one star.

Married to the former Julia Dent Salter of Anniston, Alabama, Dr. Canada has one son, Robert Owen Canada, III. His official residence is Grottoes, Virginia.

Dr. Canada is a Diplomate, American Board of Internal Medicine; a Fellow of the American College of Physicians and the American College of Chest Physicians; and a member of the American Thoracic Society and the American Medical Association.

A TRIP TO SOUTHEAST ASIA

*By Sub Lt (U) David Morris, R.A.N. Republished by permissiion from the Royal Australian Medical Newsletter 2(2): 3–8, July 1964.**

The purpose of my visit to Singapore and Thailand, during December 1963, and January 1964, was to look at viral research at the South East Asia Treaty Organisation Laboratory especially in conjunction with the local problem of Thai Haemorrhagic Fever (THF). The original idea was to spend the whole vacation of eleven weeks there, but this was not possible. I spent four or five weeks in New Zealand, then flew with the Royal New Zealand Air Force to Singapore, where I was to spend three weeks.

Singapore

In Singapore, I was accommodated in the Wardroom of the Royal Naval base in delightful tropical surroundings and comfort. The base has six thousand Britons and four thousand natives. The R.N. Surgeons were most hospitable, inviting me to the Base Hospital for ward rounds, outpatient and radiology sessions, etc. They also arranged day visits to three local hospitals. The R.N. Base Hospital is well known to R.A.N. Surgeons and I shall not elaborate, save to mention the obvious advantage to medical practice of having families and civilians to treat as well as Naval personnel. The large oriental population provides valuable medical experience. Specialties include Surgery, Obstetrics, Gynaecology, Radiology and Medicine. I am indebted to Surgeon Captain Curjell, R.N., and staff for their hospitality and encouragement.

The British Medical Hospital is a large establishment (approx 750 beds) where I attended a round with a Major in the Australian Army, a Queensland graduate, who is preparing for his M.R.A.C.P. It was interesting to see four cases of leptospirosis and three of malaria in one round. It will be this hospital

* Our special thanks are extended to the Medical Director General, Surgeon Captain R. M. Coplans, Q.H.S., R.A.N. and to Surgeon Commander S. J. Lloyd, R.A.N. (Editor of R.A.N. Medical Newsletter) for permission to present this illuminating article in the USN Medical News Ltr.—Editor.

that will bear the brunt of any casualties from Borneo.

The Director of tuberculosis control services for Singapore Island, Dr. Wong, made me at home and explained the agressive attack being made on tuberculosis in that area. Comparative figures show the incidence of tuberculosis to be falling towards that of Western countries. UNICEF aid is invaluable in continuing this work. Localities are serially micro-xrayed and suspects are isolated, then investigated and if necessary treated at the modern chest hospital, Tan Tok Sing.

Tan Tok Sing is a beautiful hospital of 750 beds. It is staffed by highly qualified practitioners, many of whom have, or are taking, higher qualifications in the United Kingdom. Chest surgery is undertaken, and at the time of my visit the services of a visiting chest surgeon were being sought for post-graduate instruction. The staff invited me to a Christmas party, where I was introduced to the delicacy Satay (highly flavoured pork or chicken on a straw), and later to luncheon with the RMO's.

Spare time was spent by the pool at the Ward-room, in Johore Baru over the causeway on the mainland; rowing on Johore Straits; at Kranji War Memorial or the Cemetery for 27,000 allied soldiers at Changi near the famous War prison; or in the city with family friends.

New Year's Eve was spent with Australians at Butterworth, on the mainland of Malaya over from Penang. On New Year's day I flew on to Bangkok with Malaysian Airways.

Thailand

The three weeks in Thailand were most profitable and enjoyable and made so by the frank hospitality of the Thais and Americans with whom I was to work and live. My host was Dr. Scott Halstead, U.S. Army Major directing the Virology Department of the SEATO Medical Research Laboratory in Bangkok. He had kindly arranged accommodation with Captain Keefe, a Veterinary researcher interested in rabies.

The Laboratory. This SEATO Lab, financed by the U.S. Army Medical Corps, is under the directorship of a pathologist, Colonel Hansen, and has very liberal research aims, not all to direct military medical advantage; within this liberal framework are several active research programmes. Many medical disciplines are represented e.g., Bacteriology, Pathology, Virology, Entomology, etc.

The Senior researcher in each Department is a highly trained American with a staff of Thai assistants. The Virology Department is headed by Dr. Halstead and Thais (most of whom have U.S. post-graduate qualification in Science and/or Medicine) staff the three main sections, Isolation, Tissue Culture, and Serology. They are assisted by locally trained technologists and Science graduates. In Virology, Dr. Halstead actively directs all phases of the research programme. I shall confine further remarks to the Virology Department.

The building is very modern, air-conditioned in parts, and well equipped by the Rockefeller Foundation and SEATO. The specific viral problem in South East Asia is Thai Haemorrhagic Fever (THF). This disease was first described in Manila in 1955 by Professor W. McD. Hammon of Pittsburg. By the rainy season of 1956 it was found in epidemic proportions in Bangkok and has since reappeared every "wet" with increasing incidence.

Thai Haemorrhagic Fever

This fever is an acute viral illness of children with high mortality. It is caused by an arthropod-borne virus, related to the Dengue viruses.

This may be shown (1) serologically by Haemagglutination Tests, etc., (2) by isolation after repeated passage in mice then tissue culture.

Its vector is the mosquito *Aedes aegypti.* These predominate in central Thailand in the rainy season of June to October. Man appears to be an intermediate host.

Incidence. In 1959, 2418 cases were hospitalized with 240 deaths. In 1962, 6086 were hospitalized with 346 deaths. In previous years it was only seen in Bangkok and only in specific parts of that city. Now it is reported in the flat central area of Thailand, and also Calcutta. A similar disease has been reported from Manila and Singapore. THF mainly affects children from 1 to 14 years, with maximum incidence around 3 or 4 years of age. Caucasian children are seldom affected.

Pathology. Diffuse haemorrhages, probably due to capillary fragility and thrombocytopenia, are seen in all organs, mainly the skin, liver, spleen and heart.

Clinical Features. It is a disease of acute onset with fever, malaise, hepatomegaly, splenomegaly, pain in the limbs, and petechiae particularly on the forearms and forehead; about the fourth day catastrophic circulatory failure may occur, presumably from cardiac damage, with imminent death. It is not uncommon for a child to die on admission for "PUO", but these are often THF cases.

Investigation. Serological tests should be positive

but this takes time and tissue culture takes longer. Differential Diagnosis must include the purpuras, infectious mononucleosis and leukemia. Prognosis depends on treatment and the rapidity with which it is begun.

Management. There is no specific treatment; immediate control of incipient circulatory failure is important. Intravenous therapy is almost routine.

Much work on isolation and epidemiology, and also of creating an awareness of the hazards of THF in South East Asia, has been done by Dr. Halstead, and his colleagues.

The time I spent in the laboratory was divided between reading the literature and working in the various sections; noting, watching and assisting in routine procedures, e.g. preparing tissue culture media or inoculating mice.

Professor Hammon, one of the world's foremost Virologists, visited Bangkok for three days whilst I was there. He is vitally interested in arbo viruses, especially in Asia. It was of value to hear him discourse over dinner on viral research throughout the world, e.g. in the Amazon (Belem) Europe and South East Asia.

For two days I accompanied a Thai mosquito collecting group to a city and national park 160 kilometers from Bangkok, along the Thai-U.S. Friendship Highway. Larvae were collected in the streams and adults on bared legs at night. This was a pleasant opportunity to see rural Thailand.

Colonel Pitts, a U.S. Army Officer and neighbour of my host, invited me to accompany a group of two Thai Colonels, two U.S. Colonels and one Thai Lieutenant by air for three days inspecting radio communications along the Laos border country. On the first day, we travelled by Caribou to Udorn, forty miles from the border, where I visited the District Hospital (100 beds). The full wards were made to seem even more full with relatives living in. The medical officers here do a marvellous job. Next day, we came down by helicopter to Ubon where the R.A.A.F. has a summer base in a city of 50,000 and district of 1,000,000. A hospital of 250 beds serves this area and is obviously overworked. There is an extremely high incidence of vesical calculi in this particular area. In this hospital alone the Superintendent operates on 500 cases a year; about 2 per day. Baby boys often die from renal tract infections concomitant with or secondary to vesical calculi. Old men often have stones the size of emu eggs removed. This localised problem also attracts the attention of Dr. Halstead. The third day was spent flying to north-west of Thailand and then returning to Bangkok.

Back in the city I visited the Children's Hospital and here saw my first two cases of diphtheria (unfamiliar to my generation) with the classical opaque membrane and inspiratory stridor; also a late THF case and a case of retinoblastoma.

The new Tropical Medicine Hospital (400 beds) is very modern and extremely well appointed and it was here that I was shown two cases of classical elephantiasis involving the lower limbs. This too was valuable clinical experience for me. Filariae abound in the south of Thailand. This tropical district and its endemic diseases interest the Dean of the Medical Faculty of Chulalongkorn University, who has embarked on an active entomological research programme with special interest in the filariae. The Dean was especially interested in Australia, having visited Sydney, and reciprocated the greetings I conveyed to him from the University of Queensland Medical School.

Though much of the time was spent in the laboratory, a good part was spent exploring the sights. These included the annual intervarsity soccer match, bargaining for goods; and seeing the exotic temples, the Temple of Dawn, the Royal Barges, the Floating Market, the ruined capital of Ayuddyah, etc; as well as watching Thai boxing.

I returned to Singapore in late January, to connect with the RNZAF flight to Auckland and Brisbane a few days later.

My impression of Thailand is one of smiling hospitable people, bent on maintaining a Western style democracy in the face of a rapidly approaching Communist front, at the same time accepting and planning for their fast changing role in a far from quiescent South East Asia.

FEDERAL HOSPITALS MEETING

The Federal Hospitals Meeting in connection with the New England Hospital Assembly will be held at the Hotel Statler in Boston, Massachusetts on 31 March 1965. A Military Section in conjunction with this meeting will be held on the above date and will be at least two hours in duration.

By authority of the Chief of Naval Personnel, one retirement point may be credited to eligible Naval Reserve Medical Corps officers in attendance. Officers are requested to register with the Commandant's Representative in order that attendance may be recorded and reported.

COMING SOON

Through the combined efforts of Rear Admiral R. B. Brown MC USN, Surgeon General of the Navy, and Dr. Ben Eiseman, Professor and Chairman, University of Kentucky Medical Center, a new series of articles will appear in the U.S. Navy Medical News Letter. These concise articles will bring to the Medical Officer, wherever he may be stationed, the most recent developments in the medical world. Listed below is the tentative list of the first series of these articles entitled, "What's New in the Treatment of the Injured."

1. Management of Septic Shock Complicating Trauma by Dr. Jerry Rosenberg
2. Automatic Ventilators by Dr. Peter Bosomworth
3. Vasodilators by Dr. Dean Morrow
4. Hyperbaric Oxygenation by Dr. Dan Wingard
5. Mannitol by Dr. Paul Weeks
6. Saline in Burns and Shocks by Dr. Ben Rush
7. Low Molecular Weight Dextran by Dr. Ben Eiseman
8. THAM and Sodium Bicarbonate by Dr. Frank Spencer

It is hoped that these articles will inspire timely contributions from other authors.

—Editor

THE NAVY TISSUE BANK—PAST AND PRESENT

LCDR Michael F. Dolan MC USN, Medical Annals of the District of Columbia XXXIII(12): 600-602, December 1964.*

The Tissue Bank of the U.S. Naval Medical School at the National Naval Medical Center in Bethesda, Maryland has been in existence since the Korean conflict. It was the fruition of an idea conceived by Dr. George W. Hyatt (now Professor and Chairman of Orthopedic Surgery at Georgetown University) who organized the Bank primarily to procure, process and store tissues for orthopedic and reconstructive surgery on the casualties from that conflict. The passage of time has witnessed the evolution of the Bank from the original 1-room laboratory containing a small freeze-drying unit to its present suite of rooms and laboratories occupying 1½ floors of the South Wing of Building No. 1, National Naval Medical Center.

The Tissue Bank Department of the U.S. Naval Medical School is divided into several divisions: the Bank itself with its operating-room facilities, storage facilities, and case registry; the tissue chemistry division which serves as a quality control laboratory as well as a laboratory conducting research relevant to the purpose of the Bank; an immunology division whose primary function is elaboration and elucidation of the homograft reaction; and the tissue culture division concerned with the development and assay of methods of viable tissue storage.

At present the tissues that we bank and some of their uses are split thickness skin, primarily used for covering burn patients; fascia, used quite extensively in Lowman procedures; dura, used for closure of meningeal defects; cortical bone, used as onlay grafts in fracture repair or spinal fusion; ground cancellous bone, used as a filler in curetted bone cysts; rib matchsticks, used as supplemental filling in back fusions; and cartilage, used in plastic and dental reconstructions. At one time arteries were banked routinely, but because of innovations in the synthetic polymer field the Bank now receives very few requests for blood vessels. For this reason vessels are obtained and processed only at the specific request of a collaborator. We do not store eyes but occasionally procure eyes for the Washington Eye Bank when a request is made.

The tissues are prepared by a process of freeze-drying and are capable of prolonged storage at room temperature without significant changes with regards to their clinical performance. The subjugation of tissues to this lyophilization procedure precludes viability so that when they are suitably reconstituted with physiologic saline they can only serve as bio-

* Director, Tissue Bank Department, U. S. Naval Medical School, NNMC, Bethesda, Maryland, Republished by permission of the Editor of Medical Annals of the District of Columbia.

logically acceptable materials apparently incapable of initiating a homograft response[1] but capable of providing protection or support.[2]

Principal interest in the past was directed toward the production of a standardized clinically utilizable and useful product, and through the efforts of previous directors this goal has been realized.[3-6] The present orientation is more toward basic and applied research with the ultimate goal of augmenting, and in some cases completely replacing currently available banked tissues with more economical and readily available synthetic substitutes which may be equally or better able to accomplish particular jobs and developing techniques for viable tissue storage.[7, 8] It is thought that synthetic materials or anorganic heterograft material[9] will eventually replace a considerable number and possibly all of the different types of deposits of presently available lyophilized human material. Until this possibility is completely realized, however, we are continuing to explore new applications for the presently available product as well as evaluating the need for, and technical difficulties associated with the procurement and processing of new preparations. Indeed, this past year has witnessed the formulation of a collaborative study to test the effectiveness of processed iliac dowels in anterior spinal fusions. It has also seen the utilization of whole lyophilized fibulae in the replacement of "pencil thin" tibiae in an arrested case of osteogenesis imperfecta, the results of which are not presently available. Indeed, lyophilization and vacuum packing have proved to be a most satisfactory method of processing canine tendons,[10] and a collaborative effort is being made to evaluate the performance of human tendons similarly processed. The clinical utility of a segment of lyophilized distal femur with attached articular cartilage as a half-joint preparation is currently being explored by one of our collaborators[11] in a case in which the corresponding autogenous material had to be removed because of involvement by a giant-cell tumor. In this instance we are given some reason for optimism by the reports that the patient, 7 weeks post-surgery, exhibits 70° flexion in that joint and is capable of straight-leg lifting exercise. The graft itself demonstrates punctate areas of translucency consistent with revascularization. We are well aware of previous studies on this matter[12] and those which have shown that there is a transient "take" period of several months' duration, after which time the graft finally sloughs.[13] We are also aware of serious reservations expressed by some[14] on the matter of transplanting joints or half-joints to weight-bearing positions. Nevertheless, the value of lyophilized material for joint reconstruction with the concomitant preclusion of sufficient residual antigenic material to initiate a homograft response has never been ascertained as far as I know and may well perform considerably better than those used, either fresh or stored at —20°C.[12, 13]

There are several areas of basic as well as applied research currently being explored in our laboratories. Foremost among these are studies aimed at elucidating the biochemical and functional alterations attendant upon freezing cells and whole organs, with the idea of developing techniques for the prolonged storage of tissues in a state that will permit them to retain complete functional capacity over prolonged storage. Obviously, freezing is not the only means of preserving material; indeed, it may ultimately prove to be inferior to some other techniques, but we are exploring the potential applicability of this method for 2 reasons: (1) Our experience has been in the field of freezing and our laboratories are geared to perform pertinent studies in this area, and (2) there is evidence available from nature that organisms can tolerate freezing and even subsequent drying (e.g., bacteria, fungi, etc.), rendering them capable of prolonged storage; several animals as well as isolated mammalian organs can withstand extreme degrees of hypothermia during which time metabolic activity is temporarily suspended or considerably depressed. Quite recently it has been shown[15] that unprotected** rat kidney can be frozen and thawed without loss of function to the extent that the cold-exposed kidney alone can maintain a unilaterally nephrectomized animal indefinitely with insignificantly elevated BUN values as the only residuum. I think that these studies establish at least one fact, viz., that the physiologic and biochemical insult mediated through the freeze-thaw cycle is not necessarily incompatible with the retention of viability and functional integrity in mammalian organs so exposed. However, when we attempt to repeat these and similar studies in dogs the best results that have been reported to date are restoration of normal function after taking the kidney down to a temperature of —6°C.[16, 17] Attempts to lower this temperature have been unsuccessful in our hands to date although some recent evidence[18] indicates that this feat may well be possible. It appears at present that this problem may be resolvable only with recourse to the knowledge of the cryogenic engineers since the resolution of the problem of rapid heat exchange in a mass of tissue of such size as the

**Not previously exposed to chemical agents known to afford some protection to cells against cold injury, e.g., dimethyl sulfoxide (DMSO), polyvinylpyrrolidone (PVP), glycerol, etc.

kidney may well be the elusive key to the matter of viable organ storage.

The perfection of a method of viably storing tissues and organs, however, would be of only limited significance in the face of the homograft response. Consequently a good deal of our time and effort goes into attempts at more careful definition of the mechanisms of homograft reaction in order to lessen its significance to plastic and transplantation surgery. Exploration in this area is focused on the detailed histochemistry of the reaction and the incubation of grafts with selected metabolites in an effort to render the graft less antigenic to the host.[19] In more elaborate terms, we are seeking to render the graft's phenotype more compatible with that of the host. Our expectation is not that gene changes will necessarily occur from our treatment but that by sufficiently altering the phenotype a state of permanent tolerance may be achieved through adaptation.

The other area of major interest is radiation protection. The Tissue Culture Division has developed a system for short-term (up to 10 days) viable storage of human bone marrow[20]; utilization of this material in clinical cases shows that the protective properties of autologous bone marrow have not been lost during storage. Prolonged frozen (1 year) storage of autologous canine bone marrow has also been shown in our laboratories to effect survival with almost the same efficiency as fresh preparations. More recently considerable attention is being given to the finding[21] that pooled homologous peripheral white blood cells from guinea pigs prepared by a modification of the fibrinogen flotation method of Skoog[22] can significantly decrease the mortality statistics in lethally irradiated animals. These studies employed fresh as well as frozen and stored-cell populations. In the guinea-pig system no evidence of runting syndrome has become evident after 6 months postinfusion.[23] Studies of a similar nature are now being carried out on dogs in an attempt to successfully negotiate the phylogenetic pathway leading to man. Although these studies comprise our main pursuits, selected pilot studies are constantly opening new avenues and closing others so that major efforts will continue to be directed along the most promising roads.

In an attempt to summarize the aspirations of the Navy Tissue Bank, I will relate the following story.

When an official of the Massachusetts General Hospital was asked whether the operation to successfully reanastomose an essentially completely severed limb was a unique accomplishment the reply was that the priority would have to go to the Arabian physician-brothers Cosmas and Damian.[24] The reference, of course, was to the legend of the "Vision of the Black Leg" which has been perpetuated through the centuries and graphically portrayed in several hundred paintings going back to the fourteenth century. It tells of the removal of a cancerous leg from an otherwise healthy Caucasian by the physician-brothers and its replacement with a functional leg which had been removed from a Moor buried that same day. It is the realization of the biological implications of this legend and the capability of transplanting bone marrow, kidney, skin, spinal cord, etc., which truly reflects the hopes of those of us in the field of tissue banking. Indeed, this legend and all that it implies might be cited as the reference for our motto "*Ex Morte Vita*"—"from death, life."

REFERENCES

1. Guttmann, R. D., and Katz, M., in International Symposium, University of Padova, May 1963. Minerva Med, 1963, 54, 2489.
2. Thomas, E. D., and Gresham, R. B.: Surg Forum, 1963, 14, 442.
3. Dolan, M. F., and Heaton, J. A., in International Symposium, University of Padova: See ref 1.
4. Gresham, R. B.: Freeze-dried cortical bone homograft-roentgenographic and histological evaluation. Clin Orthop, 1964, 37 (November).
5. Sell, K. W., Hyatt, G. W., and Gresham, R. B., and Artz, C. P., editor: Research in Burns. Washington, D. C.: Amer Inst Biol Sci, 1962, p 351.
6. Wilber, M. C., and Hyatt, G. W.: Bone cysts—results of surgical treatment in 200 cases, presented at the 27th Annual Meeting of the American Academy of Orthopaedic Surgeons in Chicago, January 1960.
7. Perry, V. P.: Fed Proc, 1963, 22, 102.
8. Gresham, R. B., Perry, V. P., and Wheeler, T. E.: JAMA, 1963, 183, 13.
9. Gresham, R. B., and Thomas, E. D.: Surg Forum, 1962, 13, 452.
10. Potenza, A. D.: JAMA, 1964, 187, 187.
11. Dehne, E.: Personal communication.
12. Chase, S. W., and Herndon, C. H.: J Bone Joint Surg (Amer), 1955, 37, 809.
13. Herndon, C. H., and Chase, S. W.: Surg Gynec. Obstet, 1954, 98, 273.
14. Riordan, D. C.: Discussion of Entin, M. A., Alger, J. R., and Baird, R. M.: J Bone Joint Surg Surg (Amer), 1962, 44, 1518.
15. Bush, I. M.: Cryobiology, 1964, 1 (Supp. 1), 6.
16. Deshpande, P. J., and Jacob, S. W.: Surg Forum, 1963, 14, 176.
17. Monafo, W., and Dolan, M. F.: Unpublished observations.
18. Henderson, I., Innes, B., Bickis, I., and Wilson, C.: Cryobiology, 1964, 1 (Supp 1), 15.
19. Guttmann, R. D., Kraus, E. D., and Dolan, M. F.: Nature (London), 1964, 203, 196.
20. Perry, V. P., Pappas,, A. M., Wheeler, T. E., and Dolan, M. F.: Nutrient media storage of human bone marrow, in preparation.
21. Perry, V. P., Malinin, T. I., Kerby, C. C., and Dolan, M. F.: Protection of lethally irradiated guinea pigs with homologous peripheral blood leukocytes, submitted for publication.
22. Skoog, W. A., and Beck, W. S.: Blood, 1956, 11, 436.
23. Malinin, T. I., Perry, V. P., Kerby, C. C., and Dolan, M. F.: Peripheral leukocyte infusion into lethally irradiated guinea pigs, submitted for publication.
24. Shaw, R. S.: Spectrum, Jan-Feb 1963, p. 8.

EYE DONORS

In 1963, 1,112 eyes were donated to the Eye-Bank for Sight Restoration, Inc., an organization founded in 1944 to handle sight-saving elements from donor to patient and to conduct a research program. One-half of the 1963 eye donations were found suitable for corneal grafts; the remainder were used for detached retinal surgery and as research material.—*Public Health Reports 80(1): 10, January 1965.*

HUMERAL TORSION

CAPT John H. Cheffey MC USN. From the Proceedings of the Monthly Staff Conferences, U. S. Naval Hospital, NNMC, Bethesda, Md. 1961-1962.*

Recurrent dislocation of the shoulder is a relatively common affliction. It occurs in young adults, predominantly males, and usually begins with an original dislocation which is produced with moderately severe trauma; despite adequate immobilization following the initial dislocation, recurrences ensue. The classical history relates that recurring dislocation is produced by minor trauma, or simply by a certain motion which the patient learns to avoid. Bilateral recurrent dislocation of the shoulder is not uncommon and gives further support to prevailing evidence that multiple factors, including anatomical variations, predispose individuals to this condition.

Many theories have been offered to explain its occurrence. More than 70 surgical procedures have been described for its correction with little in common except that the most successful are those which limit external rotation of the shoulder and thereby keep the humeral head in the glenoid fossa.

Doctors Debevoise[1], Cheffey[2], and Hyatt[3], several years ago, proposed that one factor in the biomechanics of the habitual dislocator is abnormal glenohumeral relationship due to an increased amount of humeral torsion.

A report on preliminary investigation was presented here to the Orthopaedic Forum Club in 1960, but the material has not as yet been published.

Torsion of the humerus is an anatomical characteristic which has received considerable attention from anthropologists and anatomists, but thus far the literature contains no information as to its clinical significance.

From the anthropologic viewpoint, many interesting aspects of humeral torsion in man and other animals can be found in the numerous studies published over the past century. Prior to 1945 many controversial and conflicting opinions existed regarding the evolutionary development and the method of measurement of humeral torsion. In 1945 Evans and Krahl published their comprehensive studies on the phylogenetic development of humeral torsion; Krahl's later report in 1947 added further clarity to the subject when he reported his findings regarding humeral torsion in man. By measuring a large number of specimens they found that the average humeral torsion in the adult is 74 degrees, and that the amount of torsion on the right is generally greater than the left by several degrees. Krahl found that an average primary humeral torsion of evolutionary origin amounting to 42 degrees exists in the humas fetus at 20 weeks of gestation. He concluded from further studies that the additional humeral torsion which occurs beyond this basic 42 degrees is secondary and reflects the effect of muscular pull on the proximal humerus during growth and development.

The clinical significance of the variation in humeral torsion has not been established at the present time, but there are certain aspects worthy of consideration in this regard. We know from the work of Doctors Dunlap and Shands on femoral torsion published in the Journal of Bone and Joint Surgery in 1953 and 1958 that torsion of the femur changes with growth from the time of birth to adolescence and adulthood, and there are certain clincal entities associated with femoral torsion, such as congenital dislocation of the hip. No analogous situations occur with the humerus as far as is known at present. However, the concept presented by Doctor Debevoise, that an increase in developmental humeral torsion might be a factor in the occurrence of recurrent dislocation of the shoulder, is the basis for the study described herein.

In their preliminary work on this project Doctors Debevoise, Hyatt, and Cheffey developed a technique for roentgenographic determination of torsion of the humerus in the living subject. In a series of normal

* Chief of Orthopedic Service, USNH, NNMC, Bethesda, Md., at time of this presentation; now assigned to SECNAV for duty.—Editor.

human subjects they measured the torsion by this technique; the results were compared with the amount of torsion found in a series of individuals who had had recurrent dislocations of the shoulder joint. Their results, in a relatively small series of cases, tended to support the hypothesis that an increased amount of torsion predisposes an individual to recurrent dislocation of the shoulder. Prior to undertaking the measurements of a series large enough for statistical analysis, it was necessary to demonstrate that the method of measurement is valid.

Torsion of the humerus is measured differently than torsion of the femur. The basic points of reference should be well understood before clinical applications are considered.

Torsion is the amount of "twisting" of one end of the humerus in relation to the other. The axis of each end is determined by the position of the articular surfaces and bony prominences. The axis of the humeral head is at one end and the epicondylar axis is at the other. The epicondylar axis goes through the medial and lateral epicondyles and rotates around the axis of the shaft of the humerus as torsion occurs. The epicondylar axis and the shaft define the "epicondylar plane." The angle between the "epicondylar plane" and the plane formed by the shaft and the axis of the humeral head determines the amount of torsion.

The increased torsion which occurs in man in comparison to lower animals has developed as an adaptation to assuming the upright position. In the lower animals in which less torsion is present the scapulae are located on the lateral aspect of the thorax, so that the head of the humerus faces posteriorly with the coronoid fossa facing anteriorly.

In humans the scapulae come to lie more posteriorly with the glenoid facing more laterally. With this shift, the articular surface of the humeral head comes to face more medially. In the anatomical position in man the humeral head faces posteromedially while the coronoid fossa is facing anteriorly.

In order to clarify what angle is measured, comparison of various hypothetical angles of torsion is made. If one considers the humeral head stationary and centered in the glenoid fossa, the positions of the elbow and forearm can be described to demonstrate the corresponding amounts of torsion in examples of different angles. At zero degrees of torsion, which does not occur in humans, with the elbow flexed to 90 degrees, the forearm would be in a position of marked external rotation with humeral head centered in the glenoid fossa. With 45 degrees of humeral torsion, the forearm would be more internally rotated from that of zero degrees to a position of approximately neutral. While at 90 degrees of humeral torsion, with the humeral head centered in the glenoid fossa, the forearm is approximately 45 degrees internally rotated. This amount of torsion seldom occurs in humans, but it can be seen that if such an individual externally rotates his forearm in the extreme, the humeral head is brought out of the glenoid fossa to a precarious extent.

Roentgenographic determination of torsion of the humerus as devised by Doctor Debevoise was fashioned after that of Dunlap and Shands for Fermoral Torsion, as they reported in the Journal of Bone and Joint Surgery. A jig was designed for placing the arm (humerus) in a living subject in a position of slight abduction in order to take a lateral view of the humeral head; from this x-ray an angle of "apparent" torsion was measured. An AP x-ray of the humeral head is also taken to measure the "apparent" neck-shaft angle. The "apparent" angle of torsion, and the "apparent" neck-shaft angles are used in a three-dimensional trigonometric formula to calculate the "true" angle of torsion.

This paper is a report on a study made to demonstrate the accuracy of this x-ray technique of measuring humeral torsion in human beings.

Twenty-five human humerus specimens were obtained from the Smithsonian Institution for this project. Two x-ray views of each of the 25 specimens were made and the amount of torsion for each was calculated. An instrument called a torsiometer, originally designed by Krahl, was used to measure visually the actual torsion of each specimen directly.

The measurements from the x-rays were then used with the formula to calculate the 'true" torsion of each specimen. The calculated torsion of each was then compared with the actual torsion as measured directly with the torsiometer. The difference between the two was considered as a plus or minus so-many degrees of error.

Figure 1 shows the calculated torsion of the specimens superimposed on the actual torsion as measured directly with the torsiometer.

The solid line and dots show the variation of torsion in the 25 specimens as measured directly. The range was from 48 degrees to 85 degrees and the average was 65 degrees. This is nine degrees less than Krahl's average of 74 degrees; however, his value was based on a considerably larger number of specimens.

The torsion of each specimen calculated from the x-ray technique is shown by the dotted line. The

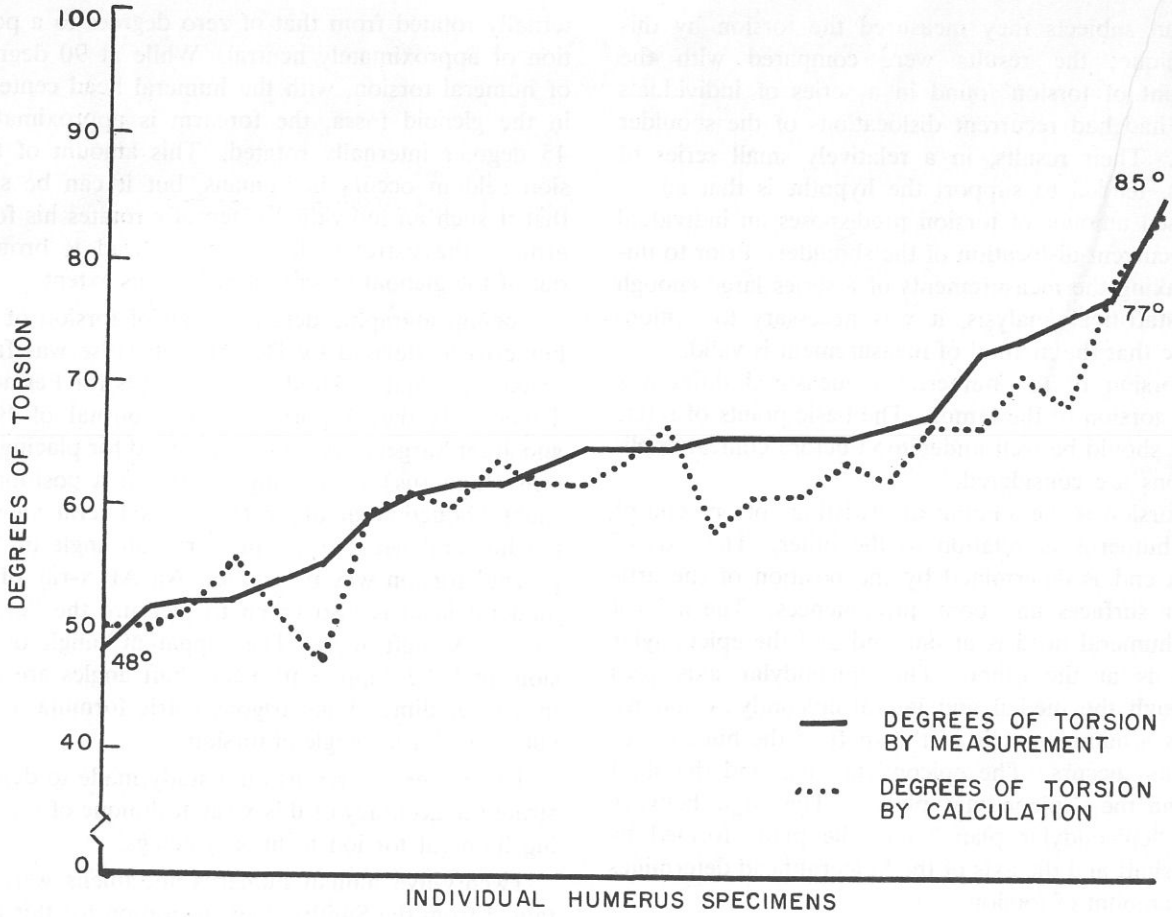

FIGURE 1.

variation of each individual specimen is shown by the distance between each dot and triangle on the same vertical axis.

These are the results obtained. All of the 25 specimens were measured within an accuracy of 9 degrees.

Eight out of the 25 specimens were within 1 degree of error. Fifteen out of the 25 were within 2 degrees. Twenty-one out of 25 were within 5 degrees.

An attempt was made to find an explanation for the discrepancies in measurement by inspection of the specimens which had shown the greatest error. It was found that the younger bones were more accurately measured, while the older bones had greater irregularities of the articular margins of the humeral head, and this led to inaccurate estimation of the extent of the articular surface from the x-rays.

There are many aspects of such a project as this which require estimation rather than precise measurement. For this reason, accuracy greater than plus or minus 5 degrees cannot be expected.

Krahl states that the torsiometer can measure within an accuracy of plus or minus one degree. This provides a basis for degree of accuracy of the direct measurement of the specimens in this series. However, an accuracy within one degree is certainly attained only after long experience.

In conclusion, the amount of humeral torsion in 25 human specimens was determined by a special x-ray technique. The actual torsion was then measured directly and compared with the results of the x-ray technique. The margin of error was found to be relatively small.

On the basis of this study it appears that the technique for roentgenographic measurement of humeral torsion as devised by Doctors Debevoise, Hyatt, and Cheffey, has an accuracy well within practical limits.

REFERENCES

1. Previously resident (Othopedic Surgery, U.S. Naval Hospital, Bethesda)
2. Chief of Orthopedic Surgery, U.S. Naval Hospital, Bethesda.
3. Previously Director, Tissue Bank, Naval Medical School, Bethesda. Now Chief of Orthopedic Surgery, School of Medicine, Georgetown University, Washington, D. C.

FROM THE NOTE BOOK

THE U.S. NAVY'S SUBMARINE MEDICINE PROGRAM

The School of Submarine Medicine convenes twice a year at the U.S. Naval Submarine Medical Center, Submarine Base, New London, Connecticut. Each class is approximately six months in duration. The curriculum includes: Basic Submarine Training, underwater physiology, hyperbaric physiology, psychiatry, dentistry, toxicology, environmental psysiology and radiobiology. Successful completion of the course is creditable toward certification by the American Board of Internal Medicine and the American Board of Preventive Medicine. Upon completion of this course of instruction, students are assigned to a tour of operational duty in the submarine force. During this tour, the student prepares a thesis and passes a comprehensive examination on submarine and diving medicine and is then designated a "Qualified Submarine Medical Officer."

By serving as a ship's medical officer on board a polaris submarine or as a squadron medical officer in a submarine squadron, the submarine medical officer not only takes care of the usual health problems of the submarine personnel, but he also develops an awareness of the potential health and safety hazards which exist aboard submarines. Having determined that a health problem may exist, he communicates his findings to the Submarine Medical Center or is transferred to the Center so that he can thoroughly investigate the problem and develop appropriate protective measures for the operating submarine force. As a consequence of this procedure, the Submarine Medical Center has been instrumental in the development of most of the health protection programs in existence on submarines including atmospheric and environmental controls, noise reduction and ear protection, adequate light and vision conservation, and shielding design and protection from ionizing radiation, to name a few.

After completing a tour of duty with an operational unit, the medical officer may apply for postgraduate training in various fields. He may prepare for certification in preventive medicine and obtain a graduate degree by attending one of the Schools of Public Health or Industrial Medicine. He may prepare himself for a career in research and obtain a graduate degree in diving physiology or radiobiology by attending one of the appropriate civilian universities. This course of action would be followed by duty at naval research laboratories and with the operational forces. If he prefers a clinical specialty, he may obtain a residency in any of the recognized clinical specialties.

Applications are now being accepted in the Bureau of Medicine and Surgery for courses convening in August 1965 and February 1966.

Further information on Submarine Medicine may be obtained by writing to: CDR J. H. SCHULTE MC USN, Director, Submarine and Radiation Medicine Division, Bureau of Medicine and Surgery, Navy Department, Washington, D. C. 20390.

U. S. NAVAL MEDICAL SCHOOL ANNOUNCES FOUR CORRESPONDENCE COURSES

The Medical Department correspondence courses "Tropical Medicine in The Field," NavPers 10995-A; "Bacteriology And Mycology," NavPers 10504; "Biochemistry," NavPers 10503; and "Serology," NavPers 10502 are now ready for distribution to eligible regular and reserve officer and enlisted personnel of the Armed Forces. Applications for these courses should be submitted on form NavPers 992, with appropriate change in the "To" line, and forwarded via official channels to the Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014. A description of these courses is delineated below:

Tropical Medicine In The Field, NavPers 10995-A. 12 Assignments—36 Points. Provides a concise guide in tropical medicine for the physician who may be called upon to practice in the tropics, and for the physician in temperate zones who may encounter tropical diseases of servicemen and others returning to the United States after duty in the tropics. Text: A Manual of Tropical Medicine, by Hunter, Frye, and Swartzwelder, 3d Edition, 1961.

Bacteriology and Mycology, NavPers 10504. 3 Assignments—6 Points. This is one of six courses

in the Clinical Laboratory Procedures series, and deals with the collection of bacteriological specimens; identification, classification, and characteristics of bacteria and fungi. Water and milk bacteriology, laboratory organization, serological testing and antibiotic sensitivity testing are also thoroughly covered. Text: Bacteriology and Mycology, U.S. Naval Medical School, NavPers 10865-BIV.

Biochemistry, NavPers 10503. 3 Assignments—6 Points. This is one of six courses in the Clinical Laboratory Procedures series and presents laboratory organization, colorimetric and photometric techniques, gasometric analysis, collection and preservation of specimens, and over 75 biochemical procedures are covered. In addition, there are 20 illustrations of laboratory instruments and an extensive bibliography. Text: Biochemistry, U.S. Naval Medical School, NavPers 10865-AIII.

Serology, NavPers 10502. 3 Assignments—5 Points. This is one of the six courses in the Clinical Laboratory Procedures series, and deals with technique of venipuncture, shipment of specimens, handling of glassware, and general technique as well as specific instructions for VDRL, Kolmer Complement, Mazzini Microflocculation, Treponema Pallidum immobilization, and other tests. Text: Serology, U.S. Naval Medical School.

Individuals who have previously completed the course in Clinical Laboratory Procedures, NavPers 10994, and Tropical Medicine in the Field, NavPers 10995 will receive additional credit for completing these courses.—Submitted by CAPT John H. Stover Jr. MC USN, Commanding Officer, U.S. Naval Medical School, NNMC, Bethesda, Md.

ERRATUM

Page 21, line 4 under "DISCUSSION" Volume 45, Number 5 of the U.S. Navy Medical News Letter should read: A well-outlined program is *now* available. . . . —Editor

DENTAL SECTION

CORTICOSTEROIDS IN OPERATIVE DENTISTRY

LCDR William R. Cotton DC USN

The advent of the clinical use of corticosteroids 13 years ago introduced to dentistry a new therapeutic approach for the treatment of dental disease. The popularity of these drugs is manifested by the increasing number of reports in the literature on their use. This report contains a review and evaluation of the present knowledge concerning the use of the corticosteroids in operative dentistry.

The adrenal corticosteroids are divided into two classes: the mineralcorticoids (sodium-retaining hormones) and the glucocorticoids. The latter have been used in dentistry for temporo-mandibular joint arthritis, periodontal lesions, endodontic treatment, and diseases of the oral mucosa. The glucocorticoids diminish the body's natural defenses against stress, impair vascularization, and interfere with the formation of fibroblasts, granulation tissue and ground substance. Their main use in dentistry has been the control of inflammation.[1] The corticosteroids decrease the permeability of cell wall of the mast cell inhibiting the release of histamine and heparin; thereby, decreasing the inflammatory response.

There has been much recent interest in the application of corticosteroids in operative dentistry to relieve postoperative dentin and pulp sensitivity and to treat exposed pulps. The earliest works [2, 3] reported

considerable clinical success in the treatment of exposed pulps. However, the number of treated teeth was small and the follow-up period was short.

Kiryati[4] studied the effect of hydrocortisone with antibiotics on experimentally lacerated rat pulps. A combination of hydrocortisone and antibiotics increased the survival of pulp tissues after injury and infection, but the part played by hydrocortisone was uncertain. Treatment of pulps with hydrocortisone alone showed 22% complete healing. Combined treatment with hydrocortisone, oxytetracycline and chloramphenicol showed 63% complete healing. Treatment with oxytetracycline and chloramphenicol without hydrocortisone showed 35% of the teeth to have complete healing; and treatment with hydrocortisone, Neomycin and bacitracin gave 18% with complete healing. Kozlov and Massler[5] also found after 14 days, evidence of reparative dentin bridging in amputated pulps of rat molars which were treated with cortisone or hydrocortisone alone.

Much of the interest in dentistry has been due to the work of Fry, Watkins and Phatak[6] and Mosteller[7, 8] who employed a mixture of Meticortelone (Shering brand of prednisolone), camphorated parachlorophenol and metacresylacetate to reduce post operative dentin sensitivity. It should be pointed out that metacresylacetate (Cresatin) is in itself a potent antiseptic and anodyne.

Fry et al.[6] applied the mixture to exposed dentin and sealed the cavity with a zinc oxide-eugenol restoration or placed it directly over an exposed pulp, occasionally modified by placing an autoclaved asbestos disk or cigarette paper over the medication, after which zinc oxide and eugenol was placed. They were highly selective in their choice of teeth to be treated and did not use controls. All but one of the 43 teeth remained pain-free based on a 4-month observation period.

Mosteller,[7] in an uncontrolled clinical study, applied the prednisolone mixture under 726 gold restorations; one week postoperatively, all teeth except 3 were free of thermal sensitivity to 46° F water. Mosteller[8] repeated his original study in a controlled clinical experiment in which the prednisolone mixture was applied to only one side of the patient's mouth. One week later the treated teeth were insensitive to 46° F water; whereas, over 50% of the untreated teeth were sensitive. The mixture was applied to cavities in 3 sound human teeth while 3 similar cavities remained untreated.

The 3 untreated teeth showed marked inflammatory changes within their pulps. The 3 prednisolone treated teeth demonstrated pulpal inflammation to a lesser degree. The number of teeth and the difference in inflammation were both too small to draw a significant histological conclusion.

Vigg[9] employed a mixture of 1% hydrocortisone and 3% oxytetracycline in an ointment base over exposed vital pulps in an uncontrolled clinical study. After 20 months 18 of 20 teeth were symptomless. In another group, after 6 months all 27 teeth were symptomless. In all instances pain, if present, disappeared immediately or within a few hours following use of corticosteroids.

Lederle Laboratories have been marketing Ledermix A (paste) and Ledermix B (cement) in Britain and Central Europe since March 1963. The former is essentially triamcinolone in a water soluble base. The latter is basically a zinc oxide-eugenol combination with triamcinolone. Ehrmann[10] has reported his clinical impressions on the use of Ledermix on 200 teeth over an 11 month observation period. Thermal sensitivity was considerably reduced in deep cavities and crown preparation lined with Ledermix. In hyperemia and early pulpitis the pain ceased in the majority of cases. In pulp exposure there was an absence of postoperative pain following treatment with Ledermix.

Previous to the work of Fiore-Donno and Baum,[11, 12] systematic histologic controls of pulp response to corticosteroids have been made primarily on rat molars.[4, 5] In their study of the histological response of human pulps with painful pulpitis capped with a corticosteroid antibiotic, they report that the corticosteroids, not only inhibit inflammatory systems, but also inhibit the chief functions of the pulp to form reparative dentin by causing a connective tissue metaplasia. Pulps capped with a mixture of a corticosteroid, calcium hydroxide and antibiotic remained symptom-free and had a normal histologic picture 2 or 3 months postoperatively. It appears that calcium hydroxide assisted in overcoming the inhibition of reparative dentin formation, but in their later work they found this not to be true.

What appears to be the best controlled study to date was recently reported by Dachi, Ross and Stigers.[13] Pairs of class V amalgam cavities were prepared as close to the human pulp as possible and coated as a blind with either prednisolone or placebo. The prednisolone was used alone rather than in combination with other drugs. The teeth were tested postoperatively for thermal sensitivity to cold and heat, and for vitality. After 7 days the teeth were extracted and evaluated histologically. Prednisolone

was slightly more effective than placebo in relieving sensitivity. In comparing the experimental and control groups of teeth no difference in histologic reaction could be discerned. The inflammatory changes in both the prednisolone and placebo-treated teeth were severe under the stringent conditions of this experiment which included only teeth with 500 microns or less of remaining dentin. The 7 day observation period was too short to determine any inhibition of reparative dentin formation by prednisolone as reported by Fiore-Donno and Baume.[11, 12]

Unfortunately most of the recent interest by clinicians has been based on reports of clinical observations [6, 7, 8, 9, 10] of the effectiveness of corticosteroids in operative dentistry. Judging the efficacy of a drug or restorative material on clinical observations alone are unwarranted. The restorative material or medicament, especially corticosteroids, may obscure the clinical subjective symptoms which may be indicative of the true histopathological picture.

From human histological evaluations, observation periods ranging from 15 to 300 days, there is evidence that the corticosteroids do inhibit dentinogenesis when employed in pulp capping,[11, 12] which possibly may be overcome by the addition of calcium hydroxide[4] even though there is some evidence that calcium hydroxide and corticosteroids are antagonistic.[11, 12] Following corticosteroid capping in rats, reparative dentin formation has been reported as early as 7 to 14 days.[4, 5] Other investigators[13] have not reported reparative dentin formation in humans after a 7 day observation period. It is apparent that the corticosteroid effect on reparative dentin formation is unsettled.

Most investigators agree that there is an antiphlogistic effect on the pulp when the corticosteroids are used for pulp capping. This is accompanied by desirable pain relief but the interruption of the natural defense mechanism by steroids is not necessarily desirable.[1] This undesirable effect may be partially overcome by the addition of antibiotics to the corticosteroids which seems to increase the survival of pulps after injury and infection.[4]

The efficacy of corticosteroids, combined with other drugs, to eliminate dentin hypersensitivity is well documented.[6, 7, 8, 10] The credibility of these earlier clinical studies has been confirmed by Dachi et al.[13] who employed prednisolone alone and found the prednisolone to be slightly more effective than a placebo.

The safety of the topical use of corticosteroids has been questioned.[14] As Ehrmann[10] points out, one application in a cavity, 0.01-0.05 mg. would be used, and this is one thousandth of the daily therapeutic dose. It is doubtful whether much of this would be absorbed systemically, even though radioactively labeled topically applied corticosteroids have been shown to diseminate throughout the pulp.[15]

In summary, the use of adrenal glucocorticoids (cortisone, hydrocortisone, prednisolone, triamcinolone) for pulp capping is of questionable value. It appears that the proper selection of teeth for capping is as important as the drug applied. Teeth with pulpitis did not heal adequately when treated with corticosteroids,[11, 12] while teeth with essentially healthy bleeding pulps healed with reparative dentin formation, [4, 5, 9] even though in both cases there was relief of pain. This relief of pain is not indicative of the pulp histology; therefore it is a blessing in disguise.

Use of corticosteroids should be viewed as an adjunct and not as a substitute for the conventional measures of pulp protection, such as calcium hydroxide, zinc oxide-eugenol, cavity varnish and cement bases. Since naval personnel are, and will be, subjected to unique environments where the availability of dental care is not obtainable, use of corticosteroids for pulp capping procedures should be limited to selected cases involving vital, asymptomatic pulps.

REFERENCES

1. Hendershot, L. C. The Use of Adrenocorticosteroid Hormones in Dentistry, D. Clin. North American, July 1963, pp. 503-512.
2. Rapoport, L. and Abramson, I. I. Application of Steroid Hormones in Pulp-Capping and Pulpotomy Procedures. A Preliminary Report, Oral Surg., Oral Med. and Oral Path., 11: 545-548, May 1958.
3. Feinchneider, I. I., L'hydrocortisone, precieux adjuvent au traitment d'endodontie, J. Can. D. Ass., 27: 203-209, Jan 1961.
4. Kiryati, A. A. The Effect of Hydrocortisone Plus Polyantibiotics Upon the Damaged and Infected Dental Pulp of Rat Molars, J. D. Res., 37: 886-901, Sept-Oct 1958.
5. Kozlov, M. and Massler, M. Histologic Effect of Various Drugs on Amputated Pulps of Rat Molars, Oral Surg., Oral Med. and Oral Path., 13: 455-469, April 1960.
6. Fry, A. E., Watkins, R. F. and Phatak, N. M. Topical Use of Corticosteroids for the Relief of Pain Sensitivity of Dentine and Pulp, Oral Surg., Oral Med. and Oral Path., 13: 594-597, May 1960.
7. Mosteller, J. H. Use of Prednisolone in the Elimination of Postoperative Thermal Sensitivity, A Clinical Study, J. Pros. Dent., 12: 1176-1179, Nov-Dec 1962.
8. Mosteller, J. H. The Ability of a Prednisolone Solution to Eliminate Pulpal Inflammation, J. Pros. Dent., 13: 754-760, July-Aug 1963.
9. Vigg, J. Hydrocortisone in Pulp Therapy, Preliminary Results of a Clinical Test, D. Prog., 2: 285-287, July 1962.
10. Ehrmann, E. H. Corticosteriods in Operative Dentistry: A Preliminary Survey, Aust. D. J., 9: 264-272, Aug 1964.
11. Fiore-Donno, G. and Baume, L.-J. Effects of Capping Compounds Containing Corticosteriods on the Human Dental Pulp, A Long Term Histologic Study, Helv. Odont. Acta, 6: 23-32, Oct 1962.
12. Fiore-Donno, G. and Baume, L.-J. Controles histopathologiques du coiffage pulpaire aux corticosteroides, Schweiz. Mschr. Zahnheilk. 73: 413-423, May 1963.
13. Dachi, S. F., Ross, A. and Stigers, R. W. Effects of Prednisolone on the Thermal Sensitivity and Pulpal Reactions of Amalgam-Restored Teeth, J. Am. D. Ass., 69: 565-571, Nov 1964.
14. Sinkford, J. C. and Harris, S. C. The Case Against Topical Use of Adrenocorticosteriods in Dentistry, J. Am. D. Ass., 68: 765-767, May 1964.
15. Fry, A. E. Lecture, Am. D. Ass. Meeting, San Francisco, Calif., Nov 1964.

EDITOR'S COMMENT—The use of corticosteroids in dental procedures is a highly controversial

issue. Doctor Cotton's excellent review of the literature is commended to careful study by all dental officers. Until more conclusive long-term histological evaluation of pulpal repair after corticosteroid treatment has been published, the dentist who practices conservative management of the pulp will refrain from using corticosteroids in treatment of pulpitis and pulpcapping cases. He might use corticosteroids as an adjunct, but he will not use any of them as a substitute for appropriate calcium hydroxide, zinc oxide-eugenol, cavity sealer or cement base treatment.

PERSONNEL AND PROFESSIONAL NOTES

U.S. Navy Dental Officer Presentations. CAPT Perry C. Alexander DC USN, U.S. Naval Dental Clinic, Long Beach, California, served as guest lecturer before the Armed Forces Desert Dental Society at a meeting held 22 January 1965 aboard Norton Air Force Base, San Bernardino, California. Captain Alexander's topic concerned, "Movement of the Condyle."

CAPT Gordon H. Rovelstad DC USN, U.S. Naval Dental School, National Naval Medical Center, Bethesda, Maryland, presented a lecture entitled, "Dental Hygienist in Pedodontics" before the District of Columbia Dental Hygienists Association on 15 March 1965 in Washington, D.C.

CAPT Rovelstad also gave a talk on, "Current Concepts of Preventive Dentistry" before the Washington County Dental Society on 16 March 1965 in Hagerstown, Maryland.

NAVY DENTISTS PARTICIPATE IN CENTENNIAL MIDWINTER MEETING

The Chicago Dental Society held its 100th Midwinter Meeting in Chicago, February 21-24, 1965. The following clinicians and their presentations represented the United States Navy during the four-day convention:

HALF-DAY SYMPOSIA

CAPT Theodore R. Hunley DC USN NDS Bethesda, Maryland	A Symposium of Modern Operative Procedures

ESSAY PROGRAM

CAPT Theodore R. Hunley DC USN NDS Bethesda, Maryland	Operative Dentistry Supports the Treatment of Advanced Periodontal Disease
CAPT Fred L. Losee DC USN USNTC Great Lakes, Ill.	Caries, Cancer, and Coronary Disease—Is There a Relationship?

TABLE CLINICS

CAPT William E. Ludwick DC USN USNTC Great Lakes, Ill.	Wearing Rubber Gloves in Operative Dentistry
LCDR J. P. Quinn MSC USN USNTC Great Lakes, Ill.	Microbial Aerosol Sampling in Dental Clinics
LT Alan L. Coykendall DC USN USNTC Great Lakes, Ill.	The Effectiveness of Rinsing the Mouth
LT Thomas F. Hafner DC USNR and LT David R. Sheppard DC USNR USNTC Great Lakes, Ill.	Preventing Amalgam Failures

TABLE CLINICS (Cont.)

LT Robert G. Bachard DC USNR and LT Joel Grand DC USNR USNTC Great Lakes, Ill.	Pathosis of the Tongue
LT Sheldon B. Bernick DC USNR and LT F. D. Carlson DC USNR USNTC Great Lakes, Ill.	A Method of Endodontics
LT Spirol Chaconas DC USNR and LT Kosmas Protopappas DC USNR USNTC Great Lakes, Ill.	Indirect Inlays and Bridges Using Checkbite Tray
B. L. Lamberts, Ph.D. and T. S. Meyer, M.S. USNTC Great Lakes, Ill.	Separations of Salivary Proteins
Irving L. Shklair, Ph.D. USNTC Great Lakes, Ill.	C-Reactive Protein and Periodontal Disease

NAVAL RESERVE DENTAL COMPANY 9–6

CAPT Evert A. Archer DC USNR Commanding Officer, Chicago, Ill.	Correction of Premature Contacts in the Natural Dentition
CAPT Robert J. DeWolf DC USNR Evanston, Ill.	Template Construction for Parallel Dowels
CAPT William H. DeWolf DC USNR Woodstock, Ill.	Manipulation of Amalgam-Dry Mix Aspect
CDR Robert B. Jans DC USNR Evanston, Ill.	Simplified Technics for Extra-Oral Mandibular Roentgenograms
LCDR Richard N. Lamermayer DC USNR Kenilworth, Ill.	The Class V Gold Foil Restoration

NAVY CIVILIAN RESEARCHER HONORED

Doctor Irving L. Shklair, a Bacteriologist associated with the Dental Research Facility, USNTC, Great Lakes, Illinois since 1952, was recently elected President of the Chicago Section of the International Association for Dental Research.

NAVY DENTIST RECEIVES AIR FORCE AWARD

CAPT Louis S. Hansen, DC USN, Head of the Officer Education Department, U.S. Naval Dental School, Bethesda, Maryland, has been authorized to wear the Air Force Outstanding Unit Award ribbon permanently. The award was granted to the Armed Forces Institute of Pathology "for exceptionally meritorious service in support of military operations from 1 July 1962 to 30 June 1964," by order of the Secretary of the Air Force. During that period, CAPT Hansen served as Chief of the Dental and Oral Pathology Division of the Institute.

LIST OF NEWLY STANDARDIZED ITEMS AVAILABLE FOR ISSUE

FSN	NOMENCLATURE	UNIT OF ISSUE	PRICE
6520–059–9007	Band, Copper, Dental Size 8, 12s	BX	.25
6520–059–9008	Band, Copper, Dental Size 9, 12s	BX	.25
6520–059–9009	Band, Copper, Dental Size 10, 12s	BX	.25
6520–059–9010	Band, Copper, Dental Size 11, 12s	BX	.25
6520–059–9011	Band, Copper, Dental Size 12, 12s	BX	.25
6520–059–9012	Band, Copper, Dental Size 14, 12s	BX	.25
6520–059–9013	Band, Copper, Dental Size 17, 12s	BX	.25
6520–059–9014	Band, Copper, Dental Size 18, 12s	BX	.25
6520–059–9015	Band, Copper, Dental Size 19, 12s	BX	.25
6520–059–9016	Band, Copper, Dental Size 20, 12s	BX	.25
6520–074–4193	Pulp Protector, Dental, Zinc Oxide and Eugenol	PG	2.30
6520–965–0006	Wheel, Abrasive, Diamond, Friction Grip Angle Handpiece, Cylinder, High Speed, 0.040 by 0.167″	EA	.62
6520–965–0009	Wheel, Abrasive, Diamond, Friction Grip Angle Handpiece, Inverted Cone, High Speed, 0.045″ Diameter	EA	.60
6520–965–0011	Wheel, Abrasive, Diamond, Friction Grip Angle Handpiece, Double Cone, High Speed, 0.120″ Diameter	EA	.66
6520–965–0012	Wheel, Abrasive, Diamond, Friction Grip Angle Handpiece, Tapered Cylinder, High Speed, 0.050 by 0.227″	EA	.63
6520–965–0013	Wheel, Abrasive, Diamond, Friction Grip Angle Handpiece, Tapered Cylinder, High Speed, 0.055 by 0.383″	EA	.66
6525–074–4542	Hanger, X-ray Film, Processing, Dental	EA	5.10
6532–890–1429	Apron, Dental, Plastic	EA	1.20
7290–890–1822	Cover, Headrest, Plastic, Disposable, 500s	RL	2.20

RESERVE DENTIST NAMED TO POST AT PITTSBURGH SCHOOL

CAPT W. A. George DC USNR, Commanding Officer of Naval Reserve Dental Company 4–10, has been named assistant dean of the University of Pittsburgh School of Dentistry.

Dr. George is a 1932 graduate of the school, and has been on the faculty since 1958, when he became professor of dentistry and chairman of the department of prosthetics. He will continue to chair the prosthetics department and serve as associate director of the graduate program in the school.

He is a member of the American Dental Association and its Council on Dental Research, and is immediate past president of the Odontological Society of Western Pennsylvania.

PEOPLE TO PEOPLE INTERNATIONAL RELATIONS

From time to time, the Dental Division, Bureau of Medicine and Surgery learns of dental officers at foreign shore stations or in travel status who, on their own initiative, practice a commendable level of international relations by becoming acquainted with leaders of the dental profession in other nations. In some cases, dental officers have visited renowned leaders of their specialty fields in other nations. Those officers who expect to visit Europe might make desirable contacts by writing to Doctor Gerald H. Leatherman, Secretary-General, *International Dental Federation*, 35 Devonshire Place, London W.1, England. U.K. In similar manner, others might correspond with Doctor B. B. Erana, Secretary, *Asian-Pacific Dental Federation*, Manila Doctor's Hospital, Isaac Peral Street, Manila, R.P.

OCCUPATIONAL MEDICINE

THE FUTURE OF HEALTH IN INDUSTRY

LCDR Carlos Villafana, MC USN, Indian Head, Md., Industrial Medicine and Surgery, 33(12): 861-865, Dec 1964.

Introduction

The success of industrial health programs is a well-established fact. This accomplishment is the end result of the continued enthusiasm, vigor, and capability of the industrial physicians who have been providing the best of care and health maintenance for the workers in their respective industries. They have faced innumerable problems and gradually changed the scope of occupational medicine from the mere treatment of industrial accidents to the current practice of an all-inclusive preventive medicine program in each major industry. The continued scientific progress and advances in modern technology are opening new avenues for expansion in this field with many new challenges to meet. New and exotic chemicals entering the market by the hundreds offer a formidable challenge for research on their toxicological aspects and their effective control. Radiation hazards place upon the health team the task of finding adequate ways of protection which must be based on more knowledge of the complexity of this hazard and how to apply this knowledge rationally. The ever-expanding small industries for which so little has been done in the way of providing adequate occupational health services offer perhaps the major area in which occupational medicine should move if it is going to live up to its high ideals of providing health maintenance and care to all workers of all occupations. This is a fertile field for imaginative industrial physicians. The solution of this problem may come from nonmedical factions if the industrial physician does not provide the necessary leadership. As automation, which in effect is a second industrial revolution, expands more and more, it will probably complicate the mental health problem in industry, forcing occupational medicine to enter the area of mental health in full fashion and probably turning this specialty into more of a social than a medical science. Herein lies perhaps the greatest challenge to physicians in industry. But the future of health in industry, complex as it looks, glorious as it may be, can be turned into hopeless failure if the occupational health team does not prepare effectively to tackle the present problems, so that it can meet the challenges of the future. The industrial physician, as the leading member of the occupational health team has the greatest share in this enterprise. Therefore, this paper will deal primarily with our role as industrial physicians in assuring that the future of health in industry is as glorious and satisfying as it has been until now.

In preparing to cope with the challenges ahead, we must take inventory of our major problems in occupational medicine and what possible solutions are available, bearing in mind that these solutions must be far-reaching and comprehensive for the benefit not only of all workers in industry but for all the members of our community.

EDUCATION IN OCCUPATIONAL MEDICINE

Recruitment: Our specialty suffers from a formidable shortage of adequately trained personnel. A large part of the occupational health services in this country are provided by private physicians with slight understanding and almost no training in the principles of industrial medicine. This is a big problem. Interest in this speciality has been developed in the past few years but not sufficiently to motivate many individuals to choose it as a career. Our aims should be directed not only to recruiting at the medical school but also the premedical college and high school levels. There are plenty of opportunities to introduce, discuss and "sell" industrial medicine to community groups, especially youngsters. The role of the industrial physician in this respect is invaluable because of his privileged position in the community. He should conduct lectures and discussions in this

field in the medical society meetings, in school meetings, with school counselors and teen-age groups. Arranging visits to the plant with school authorities offers other opportunities for contacts. Emphasizing the industrial physician's role of working for the health of groups of people as well as individuals will bring out in a few the innate desire to serve. Those expressing interest should receive special orientation. In this connection, school counselors can be of great value in detecting those youngsters with these special characteristics, those who are not only scientifically but also socially inclined.

Medical School Training: Lack of exposure to occupational medicine as a specialty in medical school is one of the greatest reasons for minimal enrollment. Inclusion of more hours of occupational medicine subjects in the modern medical school curriculum is a difficult task. Efforts should be made to present orientation lectures to all medical students on the history, development, the present and future of occupational medicine as an adventurous career rather than explaining occupational diseases that they will probably not see in the future. A pitch for occupational medicine should be made by a highly successful industrial physician who resides in the area of the medical school and who can deliver a speech with inspiration. In the meantime the constant struggle with medical school authorities to include more hours in their programs should be continued as well as using the infiltrative techniques already suggested by others.

Graduate Training: The present program of graduate training in occupational medicine in most schools is adequate to prepare physicians for positions as medical directors of large companies. However, great emphasis is placed on many occupational diseases that are out of the picture and very seldom found by the industrial physician in his industry. I would eliminate some of the occupational health seminars having to do with the "old occupational diseases" that we do not see too often and use that time to concentrate on the new problems facing the industrial physicians.

The teaching of the core courses in occupational medicine, such as statistics, public health, and sanitation should be oriented primarily but not entirely toward occupational health problems. The application of statistical principles could be better understood by using practical occupational health situations. A basic course in statistics could be given followed by a semester or two in occupational health statistics. This, in addition to intensive research training, I think, will prepare the graduate industrial physician to initiate or actively participate in worthwhile research projects.

The occupational medicine resident should have the same status as any other resident in the hospital. Through infiltrative techniques, residents should take time to discuss the occupational health aspects of particular cases in the hospital with residents of other services. This will create awareness of occupational medicine on their part. For this purpose, I think that the residency training in occupational medicine should be administered by the medical school and not by the public health school even though it is an integral part of preventive medicine. In this manner, the occupational medicine resident will be more accepted and his assistance more frequently sought by others. This will also bring him closer to the medical students where he can introduce them to or orient them better in the field of occupational medicine. Once he becomes a resident, he must remember he is a member of the "occupational health selling team" for recruitment purposes.

In the area of training for research, serious deficiencies are present in some schools because of incomplete training and supervision. First, a course is needed to prepare residents in the basic principles of research, animal and laboratory techniques and methods, especially oriented toward the study of occupational health. Only after this should the resident undertake an original research project in which he should have adequate supervision. This particular problem is one of the most important having to do with preparing the occupational medicine specialist of today for the future.

At the non-graduate level or post-graduate level, it should be the responsibility of the Industrial Medical Association, American Academy of Occupational Medicine, and other industrial health groups to conduct research training courses to open the eyes of other physicians to this wonderful field and motivate them to initiate their contribution.

As I have emphasized already, training in occupational medicine should be focused on the present and future, not in the solved problems of the past. There should be preparation for a new glory in accomplishing goals, not just recalling past achievements.

As automation becomes more and more a part of our daily lives we must prepare to deal with the particular stress on individuals imposed by the necessity of working in complete or semi-isolated environments while, at the same time, maintaining a high techni-

cal competence. What future effects this may have on the mental health of the individual is unpredictable.

In this connection, extensive training in mental health should be given serious consideration in the residency program. This should include community and plant mental health since the industrial physician of the future will probably function more at the community than at the plant level. Industrial and public health psychiatrists should provide the training in this area. The industrial physician will not only have to guide the workers with a mental problem to obtain adequate care in the community, but also he will have to work closely with the patient's physician on the rehabilitation of the mentally ill individual. This will become more and more obvious as modern psychiatric treatment and techniques are put into practice and more people are treated as outpatients while holding a job. The industrial physician will assume a tremendous burden and responsibility to be shared with the psychiatrist in caring for these patients. Obviously a problem of this nature can and will be faced successfully by the industrial physician only if he is adequately trained in mental health techniques and the principles of psychiatric treatment. He should not be a psychiatrist, but he should be able to treat most patients with minor to moderate mental health problems in his plant. He must develop skill in interviewing and counseling, in referring patients to psychiatrists and perhaps most important, in participating in the rehabilitation of the mentally ill individual on his return to work.

A major emphasis should be placed in residency training programs in the teaching of medical care and economics. With more and more demands from labor unions for comprehensive health care and the multiplicity of plans being offered and to be offered in the future, management will need advice and counsel as to what plan is best for the needs of their workers. This particular field is rather intricate and a practical knowledge of it will enable the industrial physician to assist management and labor. Here he can perform a unique function for the benefit of the workers' health since as a physician he can better advise as to what plans provide the best health services. Not only should he know about plans related to industry but also about all community health care plans since the medical care of the workers for non-occupational conditions will become more and more his business. In this regard, he can function in a position of leadership through his medical society and other health groups by becoming knowledgeable in medical care and economics and steering the course of specific health events for the benefit of the workers and their community.

Residency training should also be oriented toward finding possible solutions to the small plant problem. As a part of the training, six months should be dedicated to providing services to the small plants in the area where the trainee is studying. This can be arranged by the medical or public health school authorities with the management of these plants. This program may have three favorable effects. First, occupational health services of high quality would be provided to these plants. Second, the management of these plants would be introduced to industrial health and its advantages and may decide to continue providing these services on their own after the resident leaves. Third, a source of industrial physicans can be provided through the residents first and followed by the local physicians. For the other physicians this can be the subject of a postgraduate training course (the small plant industry health program) to prepare them adequately to serve the small plants. In addition, if sponsored by medical or public health schools, this may eliminate the problem of not violating medical ethics in trying to offer much-needed health services to these plants, since individual physicians would not be offering their services.

Postgraduate Training: The American Academy of Occupational Medicine, Industrial Medical Association, and others are engaged in providing a continual program of education for industrial physicians, especially those without formal training. More postgraduate courses in occupational medicine are needed in different centers for industrial physicians. The American Academy of Occupational Medicine has already started a series of courses which should be given at least annually. The first one given in May, 1963 at Ohio State University was very successful. Training in these courses should be oriented toward present and future occupational health problems. Toxicology and Mental Health are submitted as two of the subjects presenting the most pressing problems at the moment and for the future. A course in industrial health services for small plants should be included also.

SMALL INDUSTRY PROBLEM

The problem of providing adequate occupational health services for small industries will become more and more acute in the future as our attention may be diverted to face other difficult and engaging problems of increasing complexity. This segment of the in-

dustrial health care has been neglected. There is a lot of talk about it in industrial medical journals, meetings, societies, and so forth, but very little is done about it. Management's lack of information on the need for occupational health services and where to get them, as well as the cost involved and the lack of trained people to accomplish this purpose, has complicated the problem tremendously. There is no doubt that a large segment of the practice of occupational medicine is and probably will be the domain of the private physician with little or no training in occupational medicine who provides routine emergency care for the employees of their plants. The knowledge of these physicians should be increased to enable them to provide the kind of services which are essential to a good occupational health program.

I believe that it is the role of the industrial physician to take the lead and through the occupational medicine residency training centers and the other occupational health groups and county medical societies engage in an active program of providing adequate services of the nature described. Admittedly this is a difficult task, but we have to start somewhere. These entities, as well as the major teaching centers, should provide liaison between the management in the small plants and the industrial physicians in offering their services and educating management as to the advantages of obtaining these services at a moderate cost. This should be done after a regular course in occupational medicine, as applied to small plants, is developed. Thus, through the teaching hospitals using their residents and through these agencies using the other industrial and private physicians, a drive can be made to solve the small plant problem without violating medical ethics. Already in Kentucky the Occupational Health Institute has set the example by organizing and operating a multiplant occupational health program for small industries, and other occupational health groups should follow suit, but it is up to the industrial physician to take the lead in his own area.

The physician participating in this program should be well aware of the availability of industrial medical consultants in his area so that they can be called when a particular situation arises. This consultation service is already provided by the Industrial Medical Association by answering questions and requests for information, in writing, but it would be more effective if the local physician could use the occupational medicine specialist available in his locality for consultation. The industrial physician should make himself available to other physicians through his county medical society.

Slowly these physicians practicing part-time in industry should be made to realize that they should function as part of a team which is essentially nonmedical and that there is in occupational health a different way of doing things than in private practice. In this way, as a physician in private practice but with industrial connections he will develop respect and admiration toward occupational health and its members and will provide support in the community for industrial health programs.

REHABILITATION

Rehabilitation not only of the physically handicapped, but also of those with mental illness and chronic diseases will probably assume tremendous proportions as our population grows older and as modern techniques in the treatment of emotional disorders are put into practice. The industrial physician's responsibility now is not limited to providing adequate care and rehabilitation of occupationally incurred diseases or disability. He is called upon to work hand in hand with the private physician, the psychiatrist, the rehabilitation experts in the community, and others in returning these individuals to work as they probably constitute a significant and very useful segment of our population. He should participate more actively in the legislative activities on workmen's compensation to insure that adequate coverage consistent with adequate rehabilitation is offered. This he can do by attending hearings on workmen's compensation in his state and proposing from the health standpoint what he feels should constitute a functioning, practical, adequate program. He must educate the other physicians in this area of rehabilitation by stressing the need for early referral to the specialist after an injury. In doing this, he will be performing one of his most important functions as an industrial physician. His interest here is derived not only as a physician but as a responsible citizen of the community who has great power to decide whether a man may be a happy useful citizen or a burden to society. In this area of rehabilitation lies one of the greatest challenges to the nation in the future and industrial medicine has a large share of it.

ENVIRONMENTAL HEALTH

Preparing for the challenges ahead is going to require an active role on the part of the occupational health team, and the industrial physician as its

leading member. This will entail an all-out movement into the community to carry out the preventive health program which has been so successful in the large plants. His role is a big one since he will no longer be isolated in the plant; the new problems will require community action. Many of these problems will be community problems which may have originated in the plant or vice versa. The health protection of the workers will no longer be his only concern. Instead, the demands of the increasingly complex environment will require him to work hand in hand with other members of the health profession, voluntary agencies and government in a joint effort. This is perhaps the greatest mandate of occupational health today. For success, the industrial physician's role will be determined by his preparation for it. We have previously emphasized his responsibility in obtaining adequate continued training, his role in the small plant problem, in rehabilitation, in workmen's compensation, in the medical societies, in recruiting interested young people in the field, in training other physicians and groups, in becoming a health economist, to function adequately in research and in mental health. All these are essential duties of the present and future industrial physician if he is going to maintain his leadership as a member of the future environmental health team. It will appear that he is drifting away from the medical profession to enter into the social sciences. But this is not really so. As a medical member, he will maintain the medical skills necessary to occupy such a position, but he will not be limited to the specific role of physician but rather to a more far-reaching, all-encompassing domain, the domain of the individual in relation to his environment as a whole.

RESEARCH

Health in industry and the community cannot survive without adequate research. The challenges facing us especially from the toxicological, radiation, chronic disease, and mental health standpoints are tremendous. This demands that every industrial physician participate in some kind of research project at all times. Training for this is required for those without experience and this has been included in residency programs. It should also be included in postgraduate training courses for other physicians. There is need for more knowledge in those exciting fields and also in applying the knowledge we already have. Here government's role should be emphasized and it should probably be expanded. More research projects directly connected with industry should be carried out. These should not be limited to large medical centers. The industrial physician should receive assistance from Public Health Services or from such an agency at a state level on how to conduct research in a particular problem. This will slowly create the necessary climate and desire to investigate while meeting all the necessary requirements of good research. This help should also be forthcoming at the local level from local health departments.

CONCLUSION

The future is filled with challenges of immense proportions. These are not only of the national level, but also international. There are many countries undergoing rapid industrialization without adequate industrial medicine programs to keep pace with it. The ill effects this will have on the physical and mental health of the community may be staggering, but stands as a mandate for us to participate actively in world health. We must increase our channels of communication with other countries in this field so we can relay our knowledge and they can apply what may be suited to their special needs and conditions.

The industrial physician has his hands full and there is much to be done in industrial health. The great accomplishment of providing high quality occupational health programs in large industries should be a source of satisfaction but now we should turn to the many other unsolved problems and prepare to cope with oncoming ones. As we move into the era of automation, the laser, the new exotic chemicals, the complex radiation hazards, and others, health in industry will expand its roots into the community and indeed into the whole environment. It will not be long before occupational medicine will become environmental medicine as the industrial physician moves out of the plant "shell" to protect the health of the workers in the community too, while performing services altogether different from the services performed by the other members of the medical profession. In this endeavor, as the most important member of the environmental health team he will be assisted by the environmental hygienist, the environmental nurse, environmental safety engineer, and other members of the present occupational health team who will also have to expand their services to the environment as it becomes more complex. The role of the industrial physician will be one of great leadership and the extent to which he is successful will depend on his preparation now to face the challenges later.

DISEASES OF WHITE COLLAR WORKERS

David H. Goldstein, MD and Leo Orris, MD, New York, N.Y., Public Health Reports 79(11) Nov 1964.

Approximately 3 percent of all occupationally caused disabilities are attributable to disease. The remainder fall into the category of accidental injuries. About half of all reported occupational diseases were found in blue collar workers or workers engaged in manufacturing. Why then this interest in the occupational diseases of white collar workers? The reasons are simple: Occupational diseases are largely preventable, and when they occur they are expensive.

The legal definition of an occupational disease varies. For the purposes of this study, an occupational disease is defined as a compensable disease that arises out of and in the course of employment. It is any abnormal condition of health due to specific occupational hazard other than trauma. In general, occupational diseases fit into the following categories: dermatoses; diseases due to infectious agents; diseases due to dusts, fumes, gases, vapors, or mists; or diseases due to physical agents. Newly added are aggravation of pre-existing nonoccupational diseases and emotional stress. Many times it is exceedingly difficult to determine whether a specific illness occurred on the job or elsewhere, as, for example, in the household kitchen. This applies particularly to dermatological conditions.

Automation and other technological advances can be expected to expand the white collar segment of the labor force at the expense of the blue collar group. According to the 1960 census, women constituted approximately one-third of the total civilian working population of the United States. Nationally, 54 percent of the employed women were in white collar jobs.

A brief outline of present problems may help to forecast the problems of the future.

Dermatoses

It has been variously estimated that 50 to 80 percent of all occupational diseases are diseases of the skin.

Much like all occupational skin diseases, most of those affecting white collar workers are caused by chemical agents, with mechanical, physical, biological, and plant agents playing a lesser role. Chemicals, such as the dichromates, resins, plastics, and dyes, are among the most frequent offenders, and they may act either as primary irritants or sensitizers. The irritants will cause an eruption at the site of contact in any individual, whereas the sensitizers will not produce a reaction on initial contact but will sensitize the skin so that eruption occurs on later exposure. For example, a clerk washing a duplicating machine with an alcoholic solution may develop red, dry, crusted hands from the irritant action of the solution and eventually become sensitized to the ink and react violently not only on the hands but on other sites. On the whole, white collar workers are more likely to develop allergic reactions than industrial workers, who are more exposed to acids, alkalies, and solvents, many of which are strong skin irritants.

A mail clerk, then, using adhesives and glues may be sensitized to the synthetic resins incorporated in such material. And the dyes in carbon paper and chalk may affect not only the typist and the teacher but also the executive giving a "Chalk talk." The chemical 4-t butyl catechol was used initially in some copy paper processes, and the clerk running the copy machine, the secretary collating the papers, and the executive reviewing the reports all developed dermatitis. When this chemical was identified as the allergen and eliminated, the dermatitis subsided. However, with the proliferation of newer processes, trouble from this source may again be encountered.

The chromates are a frequent cause of dermatitis. These chemicals, found in a wide range of materials and industries such as ink, textiles, dyes, matches, photography, photoengraving, rubber, and cement, cause various forms of dermatitis ranging from primary irritation to ulceration. The most frequent reaction encountered in the occupational group is allergic dermatitis caused by the hexavalent salts, sodium or potassium dichromate. The railroad industry found that sensitization to dichromates may take a long time to develop and even longer to subside. When dichromates were added to the coolant system of diesel engines as an anticorrosive, it took months or years for dermatitis to develop. The first cases occurred among those actually engaged in filling and draining the radiators. Later other roundhouse workers and then office employees were affected. Minute amounts of dichromate became widely disseminated and were enough to sensitize many in the vicinity. Once acquired, the dermatitis may linger, despite removal of the apparent source, be-

cause of the widespread use of dichromate compounds and the new sources of exposure that are continually being uncovered. For example, it recently has been found that the pockets of those carrying safety matches may contain significant amounts of dichromate deposited from the matches.

Other frequent sources of allergic dermatitis among office workers are rubber products. These compounds contain two main sensitizing agents, accelerators and antioxidants, and the puzzling eruption on a file clerk's hand may be from sensitization to a rubber finger cot or rubber bands wrapped around the hand. Sometimes a glove-like eruption on the hands may be caused by rubber gloves worn only while using a duplicating machine. In such instances a change to plastic gloves will aid in clearing the eruption.

The epoxy resins and plastics which have affected many industrial workers also have produced allergic skin reactions among white collar workers. These compounds are made from monomers which harden into the inert polymer. However, sometimes some of the monomer does not react completely or is leached out during use of the plastic, and allergic reactions are induced. Such eruptions have occurred on dental technicians working with plastic dentures, on nursing assistants preparing acrylic fillings, and on typists using plastic earphones when transcribing dictation.

With the introduction of new fabrics processed for crease resistance, sales personnel handling such materials have developed eruptions traced to free formaldehyde, unreacted or leached from the formaldehyde-resin finish used in the antiwrinkle process. Similar situations have occurred with anti-mildew, waterproofing, or other agents.

The constant introduction of new chemicals and processes brings new problems and emphasizes the need for continued awareness.

As already stated, some substances may not only irritate but may also sensitize the skin. For example, most soaps are strongly alkaline and if left on the skin and covered will irritate it. Soaps also contain perfumes and occasionally dyes from which allergic sensitization can develop and become widespread. A file clerk with an eruption on her hands may have forgotten the pre-existing irritation under her ring and attribute her sudden widespread rash to the glue she used for paste-ups. Removing from the ring the accumulated soap acquired in dishwashing at home will remove both the irritant and the sensitizer.

Thus a frequent problem is differentiating an eruption acquired at work from one developing at home from cosmetics, detergents, photodevelopers, or other agents. In attempting to clarify this problem, patch testing in which the suspect material, in proper concentration, is applied to the skin for 24 to 48 hours may be of diagnostic value. A positive reaction is good presumptive evidence that the material is the cause of the eruption. Obviously, a good history and differential diagnosis are essential and may require the services of a dermatologist, particularly in detecting a preexisting dermatosis such as psoriasis or lichen planus. These common skin conditions are frequently aggravated by mechanical stimuli, such as friction, trauma, and pressure, which may also produce cuts, abrasions, and callosites among office clerks, business machine operators, or sales personnel. Such trauma may result in local infections or cause the spread of a psoriatic lesion. Knowing the nature of these essentially dermatological conditions and their localization in other sites not exposed to work hazards will help to establish the nonoccupational character of the eruption.

While the incidence of dermatitis among white collar workers from physical agents such as extremes of temperature, sunlight, electricity, and radiation is relatively small, there is an increasing number of instances of photosensitizing reactions from drugs, in particular, tranquilizers, antibiotics, and diuretics. The use of these medications by clerical personnel in offices equipped with fluorescent light, which emit some ultraviolet, may cause eruptions on the face, vee of the neck, and back of the hands. Others develop a "winter itch" in the summer by being constantly in an air-conditioned environment. The lowered indoor humidity, increased air movement, lack of sweating, and the excessive use of hot water and soap, all contribute to overdehydration of the skin and damage the stratum corneum. The role of bacteria, viruses, fungi, and parasites in contributing to occupational dermatoses, as secondary invaders, is well known. However, nurses, laboratory assistants, and medical technicians are especially prone to primary infection.

Some plants and woods also produce dermatitis. The most common, of course, is poison ivy. While such contact is not unusual to inhabitants of offices, some white collar workers, such as surveyors or reporters, may contact the weed during outdoor duties. Other sources of trouble have been woods such as cocobolo and the cashew. The cocobolo may be used in the handle of a letter opener, and the cashew fashioned into Voodoo dolls. Sales personnel and buyers have developed eruptions from handling these dolls, particularly those who are sensitive to poison

ivy. The sensitizers in both the cashew and the ivy are related catechol compounds.

Most occupational dermatoses are preventable, and the primary object in any preventive program is personal and plant cleanliness. Washing with a mild soap will effectively remove most irritants or sensitizers from the skin. Where the exposures are continuous and hazardous, gloves and other clothing of a material impervious to the irritant will protect the skin.

In some offices waterless-type cleaners are being used increasingly. These agents, usually liquid or a semisolid grease, effect cleansing by their solvent, alkali, or wetting agent content. The most useful and least harmful waterless cleanser is based principally on wetting agents with a neutral pH. The value of protective ointments is disputed, but in any event they are of limited use among white collar workers because of the very nature of their duties.

Diseases Other Than Dermatoses

Health workers may acquire specific infections from exposures encountered in their daily work. For example, pulmonary tuberculosis among hospital nurses continues to be reported and is deemed compensable. In New York State for the year 1959, of the 2,896 occupational disease cases closed, 92 were designated tuberculosis and 149 were classified contagious and infectious. The latter category, while not specified by diagnosis, ranged from hepatitis to amebiasis. The incidence of infectious hepatitis has increased markedly in the past few years. This may be interpreted as arising in the course of occupation when either of the following circumstances prevails: (a) a white collar worker develops hepatitis within 2 to 6 weeks from the time a fellow worker with whom he had close contact came down with hepatitis (b) an employee travels on company business to an area having high incidence of infectious hepatitis and develops the disease within the appropriate incubation period.

In this era of rapid travel, the practice of sending employees abroad on company business has increased significantly. If disease is acquired in the course of travel in areas where the hazard of acquiring such disease is many times greater than at home, then such disease has been declared occupational. Amebiasis and malaria are examples.

Food poisoning acquired in on-premises eating facilities provided by management has been interpreted as an occupational disease.

Infrequently, irritative and at times true allergic bronchitis are induced by materials handled in routine office practice. Both the solvents and the dyes incorporated in duplicating and hectograph inks have exhibited this potential.

The incidence of heavy metal or solvent poisoning among white collar workers has been low. Most of the cases have been encountered among laboratory workers who have failed to exercise appropriate precautions.

Radiation-induced skin cancer among physicians using x-ray equipment for diagnostic and therapeutic purposes is, happily, largely an affair of the past. While the safety record of the present atomic energy era has been remarkably good, accidents have occurred. Total body radiation exposures of serious and at times fatal consequence have occurred among scientists working with reactors. Most episodes have taken place during criticality operations. Cataracts have been reported among those working with the cyclotron. Microwave radiation encountered in the use of highpowered radar is capable of producing body injury through its thermal effects as well as through its capacity to induce opacities in the crystalline lens of the eye (cataract formation). Such effects have been produced experimentally in animals and by accident in both white collar and blue collar workers.

Industrial applications of radiation-producing equipment are found in metal radiography, gauging and control equipment, devices for the suppression of static electricity, and in the study of mechanical and chemical reactions with tracer isotopes.

The use of laser devices is currently a burgeoning technology. The highly parallel, intense beams of light produced have introduced new hazards to the occupational environment. The thermal effects on the skin and the eye, especially the retina, are well known. Less well understood are the athermal effects produced by the electromagnetic fields these devices create.

Travel by airplane has at times given rise to aerootitis, an acute disease of the ear resulting from pressure differences in the middle and external ear. The eardrum may become hemorrhagic and perforate.

The introduction of hyperbaric oxygen therapy under two or three atmospheres of pressure provides a real hazard of compression sickness for hospital staff and attendants.

Until recent times, occupational loss of hearing has been confined to blue collar workers engaged in heavy and noisy manufacturing.

The introduction of automated equipment for a variety of clerical operations has presented a new hazard to the noise-sensitive white collar worker. While the computer itself may be quiet, sorters and

printers used in automated operations may produce noise in the intensity range of 85 decibels. As with most occupational disease hazards, this one is also preventable. Changes in design of the machine and sound-proofing room materials are the answer.

Several States in the past few years have awarded compensation to workers who have developed acute psychoneurotic or psychotic reactions to unusually stressful business, interpersonal relationships, or work situations.

There is a growing trend in some States to concede as occupational and compensable the aggravation of pre-existing medical disease as a result of some occupational stress. Notable examples are arteriosclerotic heart disease where myocardial infarction supervenes while at work, and dermatitis aggravated by the use of soaps or physical abrasion on the job.

Summary

In general, the incidence of occupational disease is low among all workers, and lower in white collar workers than blue collar workers. Dermatitis continues to be the leading cause of occupational disease among both white collar and blue collar workers.

In this era of automation, advances in chemistry, and expanded application of atomic energy, new hazards are being introduced to the labor force. The impact of these technological advances is evident among the expanding population of white collar workers who are now manifesting occupational illnesses not previously seen in this group. Most of these afflictions are identical to those of production workers, but they are more readily preventable. An awareness by occupational health workers of the toxicological potential of new devices and chemicals, as well as vigilance in the recognition of long-established hazards, is fundamental to their control. Much more difficult in diagnosing occupational diseases among white collar workers is the distinction between illnesses acquired on the job and off the job.